DESCRIPTION

METHOD FOR FORMING A RESINOUS FRAME AND METHOD FOR
PREPARING A PANEL WITH A RESINOUS FRAME USING THE SAME

BACKGROUND OF THE INVENTION

5   TECHNICAL FIELD

The present invention relates to a method for
forming a resinous frame. In particular, the present
invention relates to a method for forming a resinous
frame and a method for preparing a panel with a resinous
10   frame using the same, which is appropriate when a side
and a corner of a glass sheet are required to have
different output amounts of a resin material applied
thereto as in a case wherein a glass sheet has a resinous
frame unified to plural sides thereof.

15   BACKGROUND ART

In Figure 4 is shown a perspective view of an
example of a system for unifying a resinous bead to a
periphery of a glass sheet. A glass sheet 1 is moved by
a moving device 3 through a vacuum cup. The moving
20   device 3 can carry out a positional shift of the glass
sheet 1 and a rotational shift of the glass sheet 1 about
an axis O perpendicular to the glass sheet. On the other
hand, an extruder 4 extrudes a resinous material having a
certain cross-sectional shape through a die 6 with a
25   nozzle 7 having a certain cross-sectional shape. The
glass sheet 1 has a resinous bead 5' unified to a
periphery thereof by moving the glass sheet 1 by the

moving device 3 so as to make the periphery of the glass
sheet 1 (sides 1a and corners 1b) followed the nozzle 7.

In Figures 5 and 6 are shown plan views of cases
wherein the glass sheet 1 is moved by the moving device
to continuously unify the bead 5' to the entire periphery
of the glass sheet 1. The glass sheet 1 is shown to have
the corners 1b formed in a rectangular shape in Figure 5,
and the glass sheet 1 is shown to have the corners 1b
formed in a circular arc shape in Figure 6. When the
resinous bead 5' is unified to the sides 1a of the glass
sheet 1, the operation can be carried out rapidly since
the movement of the glass sheet 1 is linear. From this
viewpoint, the output amount of the resinous material 5
for forming the bead 5' is great. On the other hand,
with respect to the rectangular corners 1b, the
positional shift of the glass sheet 1 is hold and the
glass sheet 1 is rotated about the nozzle 7 when forming
the bead on the corners 1b. In order to equalize the
cross-sectional shapes of the bead 5' formed on the side
1a and the corners 1b, the output amount of the resinous
material 5 onto the corners 1b with respect to a moving
speed (in other words, an output amount per unit time;
hereinbelow, the output amount means an output amount per
unit time) is minimized.

In the case of the circular arc corners 1b as shown
in Figure 6, the moving speed is reduced since the
decelerated positional shift of the glass sheet 1 and the

rotational shift of the glass sheet 1 are simultaneously carried out likewise. In order to equalize the cross-sectional shape of the bead 5', the output amount of a resinous material 5 onto the circular arc corners 1b with respect to the moving speed is required to be reduced.

In Figure 7 is shown a cross-sectional view of an example of a conventional extruder 4. The extruder 4 includes a measuring screw 9 in a main body 10, which is rotated by an extruder drive 8. The resinous material 5 is supplied into the main body 10 through a resinous material hopper 11, which is provided on an upper portion of an end of the main body 10. The supplied resinous material 5 is heated by heaters 12 in the main body 10 to be softened. The heated and softened resinous material 5 is fed to the die 6 from the other end of the main body by the measuring screw 9. The resinous material 5 fed to the die 6 thus is extruded in a certain cross-sectional shape from the nozzle 7 of the die 6 through a switching valve 13 in the die 6.

In the extruder 4, the measuring screw 9 is rotated at a certain speed by the extruder drive 8 in order to stabilize the temperature of the extruded resinous material 5. When the bead 5' (Figures 5 and 6) is not formed on the glass sheet 1, the switching valve 13 is switched to discharge the entire amount of the fed resinous material 5 outside the system. When the output amount of the extruded resinous material is reduced, the

switching valve 13 is switched to discharge a large
portion of the fed resinous material 5 outside the
system.

In Figure 8 is shown a graphical representation of
relationships among a moving speed of the glass sheet
(A), an output pressure from the extruder (B), an output
amount from the extruder per unit time (C) and a
discharge amount outside the system (D) wherein the
extruder 4 of Figure 7 is employed to unify the resinous
bead 5' to the glass sheet 1 having the rectangular
corners 1b. The moving speed of the glass sheet is
represented in a rectangular form in Figure 8 (A) since
the movement and the halt of the glass sheet are carried
out instantaneously. The output pressure of the extruder
4 is constant as shown in Figure 8 (B). When the bead is
formed on the sides of the glass sheet, the output amount
of the extruder (the output amount from the nozzle) is
great as shown in Figure 8 (C) since the glass sheet is
rapidly moved. When the bead is formed on the corners of
the glass sheet, the output amount is minimized since the
movement of the glass sheet is halted (though the glass
sheet is rotated). Since the nozzle is open at that
time, the pressure of the resinous material between the
switching valve and the nozzle is released, and the
actual output amount of the resinous material per unit
time gently changes as indicated by "a" in Figure 8 (C).
As a result, the resinous material is excessively fed to

the glass sheet 1.

At a handling step for mounting the glass sheet on and dismounting the glass sheet through the moving device and at a step for forming the bead on the corners, the

5 resinous material is discharged from the switching valve outside the system in a large amount as shown in Figure 8 (B).

In order to solve the problem of the excessive supply, a proposal has been made to change the rotational

10 speed of the measuring screw so as to control the output amount. In Figure 9 is shown a graphical representation of relationships among a moving speed of a glass sheet (A), an output pressure from an extruder (B), an output amount from the extruder per unit time (C) and a

15 discharge amount outside the system (D) in a case wherein the rotational speed of the measuring screw is controlled to form a bead on the glass sheet with rectangular corners. When the rotational speed of the measuring screw is controlled so as to be matched to the moving

20 speed of the glass sheet shown in Figure 9 (A), the output pressure of the extruder can be changed so as to be matched to the moving speed of the glass sheet as shown in Figure 9 (B). By halting the extrusion by the extruder in a handling operation, the discharge amount of

25 the resinous material outside the system can be significantly reduced as shown in Figure 9 (D).

However, even it is difficult to instantaneously

increase and decrease the output pressure of the extruder
due to the presence of the inertia of the measuring screw
as shown in Figure 9 (B) by controlling the rotational
speed of the measuring screw (Figure 9 (B)). For this
5   reason, the change in the output pressure becomes gentle
as indicated by reference "b" in this Figure, and the
output amount of the extruder changes gently as indicated
in reference "b'" (Figure 9 (C)). Under the
circumstances, the thickness of the bead 5' formed on the
10   corners 1b has been greater than that of the bead 5'
formed on the sides 1a since it is impossible to keep the
output amount of the resinous material (the state shown
in Figure 8 (C)) to a minimum when halting the glass
sheet (when the bead 5' is formed on the corners 1b of
15   Figure 5). In the case of the glass sheet 1 with the
circular arc shaped corners 1b as shown in Figure 6, a
similar problem has also been raised though the degree of
the increased thickness is slightly reduced.

It is an object of the present invention to provide
20   a method for forming a resinous frame, which is
appropriate to change the output amount of a resinous
material per unit time, and a method for preparing a
panel with a resinous frame using the same.

DISCLOSURE OF THE INVENTION

25   The present invention provides a method for forming
a resinous frame wherein a resinous material is extruded
through a die with a nozzle having a certain cross-

sectional shape to be formed so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, characterized in that an injection machine having a plunger is provided

5 upstream of the die, the injection machine injects the resinous material toward the die, and the resinous material is extruded through the die.

The present invention also provides a method for forming a resinous frame wherein a resinous material is

10 extruded through a die with a nozzle having a certain cross-sectional shape to be formed so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, characterized in that an injection machine is provided on an upstream side

15 of the die, a resinous material, which is supplied through a resinous material hopper of the injection machine, is fed into a plunger chamber of the injection machine by a metering screw at a certain amount, the resinous material fed into the plunger chamber is

20 injected toward the die by the plunger at a certain pressure, and the injected resinous material is extruded through the nozzle of the die.

The present invention also provides a method for preparing a panel with a resinous frame, wherein while

25 relatively moving a die for extruding a resinous material and a peripheral edge of a panel, a resinous material is extruded through a nozzle provided in the die and having

a certain cross-sectional shape, and the extruded
resinous material is formed on the peripheral edge of the
panel so as to have a certain cross-sectional shape
substantially conforming to the cross-sectional shape of
5   the nozzle, characterized in that an injection machine is
provided on an upstream side of the die, and a resinous
material, which is supplied through a resinous material
hopper of the injection machine, is fed into a plunger
chamber of the injection machine by a metering screw at a
10   certain amount, and that while controlling an injection
amount of the resinous material in response to a relative
moving speed between a peripheral edge of the panel and
the die, the resinous material fed into the plunger
chamber is injected toward the die by a plunger to be
15   extruded onto the peripheral edge of the panel through
the nozzle of the die.

The present invention also provides a method for
preparing a panel with a resinous frame unified to a
peripheral edge thereof, wherein a resinous material is
20   extruded from a die with a nozzle having a certain cross-
sectional shape to be formed so as to have a certain
cross-sectional shape substantially conforming to the
cross-sectional shape of the nozzle, the extruded and
formed resinous material is drawn into a pressing member,
25   and wherein while relatively moving a panel and the
pressing member so that the pressing member moves along a
peripheral edge of the panel, the extruded and formed

resinous material is unified to the peripheral edge by
the pressing member, characterized in that an injection
machine is provided on an upstream side of the die, and a
resinous material, which is supplied through a resinous

5   material hopper of the injection machine, is fed into a
plunger chamber of the injection machine by a metering
screw at a certain amount, and that while controlling an
injection amount of the resinous material in response to
a relative moving speed between a peripheral edge of the

10 panel and the die, the resinous material fed into the
plunger chamber is injected toward the die by a plunger
to be extruded onto the peripheral edge of the panel
through the nozzle of the die.

BRIEF DESCRIPTION OF THE DRAWINGS

15   Figure 1 is a cross-sectional view showing an
example of a system to practice the forming method
according to the present invention; Figure 2 is a cross-
sectional view showing another example of the system to
practice the forming method according to the present

20 invention; Figure 3 is a graphical representation showing
relationships among a moving speed of a glass sheet (A),
an output pressure from a nozzle (B), an output amount
from the nozzle per unit time (C) and a discharge amount
outside the system (D) in a forming method according to

25 the present invention; Figure 4 is a perspective view
explaining how a conventional extruder is employed to
form a resinous bead on a glass sheet; Figure 5 is a plan

view showing an example of the formation of the resinous

bead on a glass sheet; Figure 6 is a plan view showing

another example of the formation of the resinous bead on

a glass sheet; Figure 7 is a cross-section view showing

5   an example of a conventional extruder; Figure 8 is a

graphical representation showing relationships among a

moving speed of a glass sheet (A), an output pressure

from an extruder (B), an output amount from the extruder

per unit time (C) and a discharge amount outside the

10   system (D) in the conventional extruder; Figure 9 is a

graphical representation showing relationships among a

moving speed of a glass sheet (A), an output pressure

from an extruder (B), an output amount from the extruder

per unit time (C) and a discharge amount outside the

15   system (D) in the conventional extruder under another

control; Figure 10 is a graphical representation showing

relationships among a moving speed of a glass sheet (A),

an output pressure from a nozzle (B), an output amount

from the nozzle per unit time (C) and a discharge amount

20   outside the system (D) in another forming method

according to the present invention: and Figure 11 is an

overall perspective view explaining how to unify a

resinous molding on a glass sheet.

BEST MODE FOR CARRYING OUT THE INVENTION

25   Now, preferred embodiments of the method for forming

a resinous frame and the method for preparing a panel

with a resinous frame according to the present invention

will be described, referring to the accompanying
drawings.

In Figure 1 is shown a cross-sectional view of an
example of an injection machine, which is employed in the
5   methods according to the present invention. The
injection machine 14 includes a measuring screw 9 in a
main body 10, which is rotated by a drive 8. A resinous
material 5 is supplied through a resinous material hopper
11, which is provided on an upper portion of a right end
10   of the main body 10. After supply, the resinous material
5 is heated and softened by heaters 12 provided in the
main body 10. The measuring screw 9 feeds the heated and
softened resinous material 5 to a plunger chamber 16 in
the main body 9 through a conduit 15 at a left end of the
15   main body. The plunger chamber 16 has a plunger 17
inserted therein. When the plunger 17 is moved in the
right direction by an external hydraulic cylinder 18, the
resinous material 5 is sucked into the plunger chamber 16
through the conduit 15. When the plunger 17 is moved in
20   the left direction indicated by an arrow, the resinous
material 5 is injected toward a die 6.

In this Figure, reference numeral 19 designates a
controller, which controls a moving device, and which
controls a control valve 20 for the hydraulic cylinder 18
25   of the plunger 17 so as to mate with the movement of a
glass sheet by the moving device. The moving device and
the movement of a glass sheet by the moving device with

respect to the die may be similar to those shown in
Figure 4. In this embodiment, the extruder 4 shown in
Figure 4 is replaced by the injection machine 14. The
drive for the plunger 17 may be an AC servomotor or a
5 similar device in place of the hydraulic cylinder 18.

The process wherein the injection machine 14 of
Figure 1 is employed to form a bead 5' on sides 1a and
corners 1b of a glass sheet (Figure 5) will be explained.
The measuring screw 9 is rotated at a certain speed. The
10 resinous material 5 on the measuring screw 9 is sucked,
through the conduit 15, into the plunger chamber 16 by
moving the plunger 17 in the right direction. The
suction by the plunger 17 is carried out when the glass
sheet is mounted on and dismounted from the moving device
15 (a handling process shown in Figure 3 (A)).

When the plunger 17 is moved in the direction
indicated by the arrow, the resinous material 5 is
injected into the die 6, and the resinous material is
delivered on the glass sheet through a nozzle 7, having a
20 certain cross-sectional shape. When the periphery of the
glass sheet is moved along the nozzle 7 while advancing
the plunger 17, the resinous material 5 is formed on the
periphery of the glass sheet as a bead unified to the
periphery, having the certain cross-sectional shape.

25 When the glass sheet is continuously moved, a corner
of the glass sheet arrives at the nozzle 7. On arrival,
the positional shift of the glass sheet is halted to

prevent the position of the glass sheet with respect to the nozzle from changing. Then, the glass sheet is rotated about the nozzle 7. If the output amount of the resinous material from the nozzle per unit time is changed, the supply of the resinous material becomes excessive since the glass sheet is halted. From this viewpoint, the advance of the plunger 7 is halted to prevent the resinous material 5 from being supplied to the die 6. Thus, the output of the resinous material can be carried out so as to match with the positional state of the glass sheet since the advance of the plunger 17 can be instantaneously stopped as in the movement of the glass sheet.

When the formation of the bead on the corner of the glass sheet is completed, a rapid movement of the glass sheet starts to form the bead on a side of the glass sheet. The advance of the plunger in the direction indicated by the arrow restarts in response to the start of the rapid movement. In this case, the output of the resinous material can be carried out so as to match with the positional state of the glass sheet since the advance of the plunger 17 can instantaneously start as in the movement of the glass sheet.

In Figure 3 is shown a graphical representation of relationships among a moving speed of the glass sheet (A), an output pressure form the nozzle (B), an output amount from the nozzle per unit time (C) and a discharge

amount outside the system (D) in a case wherein the glass sheet 1 has rectangular corners 1b formed with the bead 5' by the injection machine 14. When the plunger 17 is operated to change the output pressure from the nozzle as shown in Figure 3 (B) so as to match with the movement of the glass sheet shown in Figure 3 (A), the output amount from the nozzle per unit time is controlled as shown in Figure 3 (C). When the plunger 17 is activated to provide the die 6 with the resinous material 5 in a amount necessary and sufficient to form the bead 5' on the glass sheet 1, the process can be carried out without discharging the resinous material outside the system (Figure 3 (D)).

In the injection machine 14 of Figure 1, the pressure of the resinous material 5 in the plunger chamber 16 gradually reduces when the plunger 17 is switched from an injected state to the halt of injection or a decrease in the injection amount (Figure 3 (B) "c"). As a result, the output amount from the nozzle 7 becomes excess due to the presence of the residual pressure in the plunger chamber 16 (Figure 3 (C) "c'"). When the injection starts from the halt of injection, there is a time lag, which is required to increase the pressure of the resinous material 5 in the vicinity of the nozzle 7. By the time lag, the output pressure from the nozzle gently increases as indicated by reference "d" in Figure 3 (B), and consequently the output amount from the nozzle

gently increases as indicated by reference d' in Figure 3
(C).

In order to cope with this problem, it is proposed
that the plunger 17 be slightly withdrawn in the

5   direction opposite to the injection direction to decrease
the residual pressure in the plunger chamber 16 when
switching from the injected state to the halt of
injection or a small amount of injection. Or, it is
proposed that the plunger 17 be moved at a speed higher

10 than the certain speed to shorten the time required for
raising the pressure of the resinous material 5 when
starting the injection after the halted state. By either
one of the measures, the output pressure from the nozzle
can be controlled as indicated by dotted lines "e" in

15 Figure 3 (B) to avoid the occurrence of the excess output
of the resinous material from the nozzle 7, enabling to
resume the injection promptly (dotted lines "e'" in
Figure 3 (C)).

In Figure 2 is shown a cross-sectional view of

20 another example of the injection machine applicable to
the methods according to the present invention. There is
provided a resin flow controller 21, such as a switching
valve and a gear pump, between the nozzle 7 of the die 6
and the plunger 17 (in the die 6 in the example shown in

25 Figure 2). The controller 19 also controls the resin
flow controller 21 so as to match the resin flow
controller with the movement of a glass sheet by the

moving device as well as controls the control valve 20

for the hydraulic cylinder 18 of the plunger 17.

In the injection machine 14 shown in Figure 2, the

movement of the plunger 17 and the resin flow controller

5   21 are interrelatedly controlled so as to match with the

movement of the glass sheet. In this case, the resin

pressure in a communication conduit 22 between the

injection machine 14 and the resin flow controller 21 is

held substantially constant. When the movement of the

10   plunger 17 is halted or decelerated, the resin pressure

in the plunger chamber 16 gradually reduces as stated

earlier. By using the resin flow controller 21 to

decrease the size of the conduit leading to the nozzle 7

when halting or decelerating the movement of the plunger,

15   the resin pressure in the communication conduit 22 can

not be prevented from reducing even if the amount of the

resin material to be injected becomes small. By

balancing the flow of the resinous material 5 to be

injected and the opening degree of the resin flow

20   controller 21, the resin pressure in the communication

conduit 22 can be held substantially constant (When the

flow of the resinous material 5 to be injected is

decreased, the opening degree of the communication

conduit is decreased by the resin flow controller 21).

25   This process is shown in Figure 10 (E). The glass

sheet, which has been rapidly moved, is halted (Figure 10

(A)). If the resin flow controller 21 is not activated

(a solid line in Figure 10 (E)), the output pressure from the nozzle 7 gradually reduces (reference "c" in Figure 10 (B)) since the resin pressure is residual in the die 6 even after having halted the plunger 17. The gradual

5 reduction in the output pressure causes the output amount from the nozzle 7 per unit time to gradually reduce (reference "c'" in Figure 10 (C)).

Conversely, when the resin flow controller 21 is activated, the excess output of the resin material can be

10 restrained (reference "e'" in Figure 10 (C)) since a shutdown is formed between the nozzle 7 and the die 6 where the resin pressure is residual. When the formation of the bead on a side of the glass sheet restarts after having completed the formation of the bead on the

15 preceding corner of the glass sheet, the resin pressure in the communication conduit is held constant (dotted lines in Figure 10 (E)). As a result, when the plunger 17 is advanced in the direction indicated by the arrow, the resin material can be promptly delivered from the

20 nozzle (reference "e'" in Figure 10 (C)) since the resin pressure has been held at a level sufficient to inject the certain flow.

In the examples stated earlier, the resin material, which is fed to the die from the injection machine, is

25 directly formed on the periphery of the glass sheet. The method for forming a resin frame according to the present invention can also be applied to press a formed resin

frame on the periphery of a glass sheet just after having
extruded the resin material in a certain cross-sectional
shape. An example of the resin frame formed by the
pressing method is one called a molding, which is

5   interposed between a glass plate for automobile windows
and a window opening of a vehicle body. The reason why
the method according to the present invention is
appropriate to the foundation of the molding is as
follows:

10   When such a molding is provided on an exterior side
of an automobile, the molding is required to have not
only dimensional accuracy but also good appearance. When
the resinous frame is formed directly on the periphery of
a glass sheet, the vibration of the injection machine can

15   have an adverse effect on a surface of the molding,
degrading the appearance thereof. From this viewpoint,
the method for pressing a formed resin frame on the
periphery of a glass sheet is effective as a method for
unifying a resin frame to a glass plate for automobile

20   windows.

When the molding is unified to the corners of a
glass plate for automobile windows, the moving speed of
the glass plate is reduced as in the embodiments as
stated earlier. If the extruder is employed to extrude a

25   resinous material without taking any measures, the excess
output of the resinous material occurs as stated earlier.
The molding is required to have high dimensional accuracy

since it is unified to the periphery of a glass plate and
mounted to a window opening of a vehicle body. The
presence of an error in the cross-sectional shape of a
molding, which is caused by even slight excess output,

5   has a great advance effect on accuracy of assembling a
glass plate for automobile windows to a vehicle body.

The corners of a glass plate for automobile windows
are usually rounded to some extent. The radius of
curvature of the corners ranges from about 80 mmR or more

10   at the maximum to a few mmR at the minimum. If the
radius of curvature is about 50 mmR, a molding can be
unified to the corners of the glass plate by extruding a
resinous material while relatively moving the glass plate
and the die for extruding a resinous material. However,

15   if the glass plate has corners of a radius of curvature
of 50 mmR or less, or about a few mmR in extreme case,
the shape of the molding fails to be stable on the
following reasons. As stated earlier, the relative
moving speed between the glass plate and the die (the

20   pressing member in this example) is accelerated and
decelerated in the vicinity of a corner. In case of a
normal extruder, the control of the output amount of a
resinous material fails to follow the acceleration and
deceleration as in case of a rectangular corner. Under

25   the circumstances, when the relative moving speed
decelerates, the resinous material is excessively
delivered in comparison with the decelerated relative

moving speed, and when the relative moving speed

increases, the output amount of the resinous material

fails to increase in comparison with the accelerated

relative moving speed. As a result, the formed molding

5   can not have a desired cross-sectional shape, degrading

the assembling accuracy. In order to prevent the

assembling accuracy from degrading, an additional step

has been required to unify the molding to the corners

(disclosed in, e.g., USP 5,316,829 and USP 5,456,874).

10   The application of the method for forming a resinous

frame according to the present invention to the

unification of a molding to a glass plate for automobile

windows, in particular the application of the method to

the unification of a molding to a glass plate having

15   corners formed in a radius of curvature of 50 mmR or

less, is effective since there is no need for an

additional step.

A method for pressing a formed resinous frame on the

periphery of a glass plate for automobile windows just

20   after having extruded a resinous material so as to have a

certain cross-sectional shape has been disclosed in USP

5,795,421. The summary of this method will be explained,

referring to Figure 11. A resinous frame forming system

50 has the injection machine shown in Figure 1 or 2

25   incorporated thereinto. The resinous frame forming

system 50 has a leading edge provided with a die 56

having a nozzle. A resinous material 55, which has been

delivered in a certain cross-sectional shape from the die 56, is drawn into a pressing member 59, which is fixed at a location apart from the die by a certain distance. The pressing member 59 has a hollow portion formed therein so

5   as to substantially conform to the cross-sectional shape of the formed resinous material 55. The formed resinous material 55 and a glass plate 51 are inserted together into the hollow portion. Thus, the formed resinous material 55 is pressed onto the periphery of the glass

10   plate 51 to be unified to the periphery of the glass plate 51 as a molding 55'. In this method, the glass plate 51 is supported by a moving device 53, and the periphery of the glass plate 51 is moved along the pressing member 59 under the action of the moving device

15   53.

The resinous frame forming system 50 has the injection machine shown in Figure 1 or 2 incorporated thereinto. The operation for unifying a molding to a glass plate for automobile windows by using the injection

20   machine will be explained. When the molding 55' is unified to sides of the glass plate 51, the glass plate 51 is rapidly moved, having a corresponding side thereof moved along the pressing member 59. In this case, the advance of the plunger injects the resinous material into

25   the die 56, and the resinous material is delivered from the nozzle.

When a corner of the glass plate 51 approaches the

pressing member 59, the movement of the glass plate 51 is decelerated. The movement of the plunger is also decelerated so as to match with the decelerated movement of the glass pane. Thus, the resinous material to be fed

5   to the die 56 is reduced to decrease the output amount of the resinous material to be delivered from the nozzle. Suppose that the output amount per unit time for unifying a molding to a corner of the glass plate is the same as that for unifying the molding to a side of the glass

10 plate, the resinous material is excessively delivered into between the pressing member 59 and the die 6. When the molding is unified to a corner while the glass plate 51 is rotating about the pressing member 59, the output amount of the resinous material per unit time, which is

15 delivered to the glass plate, is reduced in order to cope with this problem.

When the unification of the molding to a corner is completed, the unification of the molding to the succeeding side starts. In order to match with an

20 increase in the moving speed of the glass plate during forming the molding to the side, the output amount of the resinous material per unit time, which is delivered from the nozzle, is increased. In this case, the plunger can be rapidly advanced to extrude the resinous material,

25 injecting the resinous material toward the die 6 with good response.

The variation in the resin pressure in the

communication conduit, which is caused by the movement of
the plunger, can be restrained by the resin flow
controller as stated earlier (see Figure 2).

5   The present invention is not limited to the
embodiments stated earlier. An example of a panel to
have the resinous frame unified thereto is a transparent
synthetic resin panel in addition to a glass sheet, for
instance. Examples of the glass sheet include a single
glass sheet, laminated glass with plural glass sheets

10   laminated through synthetic resin intermediate films,
insulating glass with plural glass sheets and air layers
alternately provided, and so on. The panel can have
various shapes, depending on applications of the panel.
As illustrated, the corners may have a rectangular shape,

15   a round shape or an unrectangular but angular shape. The
panel may be a flat plate or a curved plate.

The formed resinous frame includes one generally
called a bead or a glazing channel for building windows,
and one called a molding or a gasket for automobile glass

20   plates. The molding includes one unified to the entire
periphery of a glass sheet, and one unified to a single
side of a glass sheet or a side including plural corners
of a glass sheet. The shape of a molding includes one
unified to an interior side surface, end surfaces and an

25   exterior side surface of a glass sheet, one unified to
either one of the interior side surface and the interior
side surface, and one unified to the end surfaces and

either one of the interior side surface and the interior side surface.

The forming method for a molding includes a method carrying out the unification by performing the pressing just after having completed the extrusion, and a method for unifying a resinous material delivered from the nozzle directly to a glass sheet. In particular, the method according to the present invention preferably applies to a molding that is not extensively exposed on an exterior side of a vehicle and that is formed so as to be unified on an interior side of the vehicle.

The relative movement between a glass sheet and the die or the pressing member may be carried out by moving the die or the pressing member or moving the glass sheet, or by moving both facing members alternately or simultaneously.

INDUSTRIAL APPLICABILITY

As explained, the present invention can employ the injection machine to extrude a resinous frame, significantly decreasing the discharge of the resinous material outside the system. In particular, the unification of a resinous frame to a corner, which has been difficult to carry out, becomes possible when a glass sheet and the die (or the pressing member) are relatively moved to unify the resin frame to the periphery of the glass sheet while extruding the resinous material from the die. In this case, a unified portion

of the resinous frame is subjected to different relative
moving speeds at a side of a glass sheet and at a corner
of the glass sheet. Even if the output amount of the
resinous material per unit time is abruptly changed so as
to match with a change in the relative moving speed, the
resinous frame can be integrally formed so as to
continuously have a certain cross-sectional shape on both
sides and corners.